

CLAIMS

What is claimed is:

- 1 1. An apparatus for holding at least one optical fiber, said
2 apparatus comprising:
 - 3 a) a top plate having an output face, a first attaching
4 face and a first through hole having a first narrow
5 section terminating at said output face and a first
6 expanding section terminating at said attaching face;
 - 7 b) a bottom plate having a second attaching face, an
8 insertion face and a second through hole having a
9 second narrow section terminating at said second
10 attaching face and a second expanding section
11 terminating at said insertion face;
 - 12 c) a spacer plate sandwiched between said first attaching
13 face and said second attaching face, said spacer plate
14 having a third through hole of wide uniform diameter
15 aligned with said first through hole and said second
16 through hole such that said at least one optical fiber
17 has a feedthrough from said insertion face to said
18 output face.
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1 2. The apparatus of claim 1, wherein said first narrow
2 section has a first uniform diameter and said second
3 narrow section has a second uniform diameter larger
4 than said first uniform diameter.
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1 3. The apparatus of claim 2, wherein said first
2 uniform diameter is essentially equal to a fiber
3 diameter of said optical fiber.

1 4. The apparatus of claim 1, wherein said first expanding
2 section has a tapered cross section.

1 5. The apparatus of claim 1, wherein said second
2 expanding section has a tapered cross section.

1 6. The apparatus of claim 1, further comprising a fiber
2 housing for mounting said insert.

1 7. The apparatus of claim 6, wherein said fiber
2 housing comprises a front portion and said insert
3 is mounted on said front portion.

1 8. The apparatus of claim 6, further comprising an
2 external housing for hermetically sealing an
3 interior of an optical device while said
4 apparatus is attached to said optical device.

1 9. The apparatus of claim 8, wherein said
2 external housing comprises a glass plate
3 disposed in a plane-parallel orientation
4 with said insert.

1 10. The apparatus of claim 9, further
2 comprising an optical gel interposed

3 between said glass plate and said
4 insert.

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1 11. The apparatus of claim 8, wherein said
2 external housing comprises a lens plate
3 having at least one lens for focusing a
4 light beam traveling along an optical axis
5 of said at least one optical fiber.

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1 12. The apparatus of claim 11, further
2 comprising a means for fixing said lens
3 plate in a tuned position.

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1 13. The apparatus of claim 1, wherein a number of said at
2 least one optical fiber are combined with a first
3 spacing in a fiber array and wherein a number of said
4 feedthrough is provided with a second spacing
5 corresponding to said first spacing such that fiber
6 ends of said fiber array may be simultaneously
7 inserted into said number of said feedthrough.

1 14. An apparatus for hermetically holding at least one optical
2 fiber, said apparatus comprising:

3 a. an insert comprising:

4 i. a top plate having an output face, a first
5 attaching face and a first through hole having a
6 first narrow section terminating at said output
7 face and a first expanding section expanding
8 towards and terminating at said attaching face;

9 ii. a bottom plate having a second attaching face, an
10 insertion face and a second through hole having a
11 second narrow section terminating at said
12 attaching face and second expanding section
13 expanding towards and terminating at said
14 insertion face;

15 iii. a spacer plate sandwiched between said first
16 attaching face and said second attaching face,
17 said spacer having a third through hole of a
18 diameter larger than said first narrow section
19 and said second narrow section;

20 wherein said first through hole, said second through
21 hole and said third through hole being positioned
22 relative to each other such that a feedthrough is
23 provided such that said fiber approaching said second
24 expanding section is guided towards said second narrow
25 section and such that said fiber approaching said top
26 plate through said third hole is captured by said
27 first expanding section and guided towards said first
28 narrow section; and

29 b. a glass plate hermetically connected to said output
30 face via an optical gel such that an end of said fiber
31 is hermetically sealed while said fiber is finally
32 bonded within said feedthrough.

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1 15. The apparatus of claim 14, wherein said top plate is
2 made of a silicon wafer having a 1-0-0
3 crystallographic orientation such that said first
4 expanding section has a taper angle of 57.5 degrees
5 off normal.

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1 16. The apparatus of claim 14, wherein said bottom plate
2 is made of a silicon wafer having a 1-0-0
3 crystallographic orientation such that said second
4 expanding section has a taper angle of 57.5 degrees
5 off normal.

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1 17. The apparatus of claim 14, wherein a number of said
2 feedthrough is arrayed and spaced in correspondence
3 with an combined array of a number of said optical
4 fiber.

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1 18. The apparatus of claim 14, wherein said insert is
2 attached at a fiber housing.

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1 19. The apparatus of claim 18, wherein said fiber
2 housing has a lateral opening for holding said
3 optical fiber during said approaching of it.
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1 20. The apparatus of claim 18, wherein said glass
2 plate is attached at an external housing
3 configured in conjunction with said fiber housing
4 such that said insert is positioned in a
5 substantially parallel distance to said glass
6 plate.

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1 21. The apparatus of claim 20, wherein said
2 external housing and said fiber housing
3 further comprise:

4 a. a cavity surrounding said insert, said
5 cavity being formed by said external
6 housing together with said fiber
7 housing; and

8 b. a tensioning means for applying a
9 compressive force via said glass plate
10 and said output face onto said optical
11 gel in uncured configuration such that
12 an excess amount of said uncured
13 optical gel flows into said surrounding
14 cavity.

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1 22. An apparatus for hermetically holding fiber ends, said
2 apparatus comprising:

3 a. an external housing having a glass plate;

4 b. an internal structure including:

5 i. an combined array of said fiber ends, said fiber
6 ends continuing as optical fibers ;

- 7 ii. a three plate insert having an array of
8 feedthroughs holding said fiber ends opposite to
9 said glass plate, at least one of said
10 feedthroughs positioning one of said fiber ends
11 in a first narrow hole section of an insert's top
12 plate and in a second narrow hole section of an
13 insert's bottom plate;
14 iii. a fiber housing for holding said three plate
15 insert and for interlocking with said external
16 housing; and
17 c. an optical gel filling a gap between said glass plate
18 and said insert.

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1 23. The apparatus of claim 22, wherein said top plate has
2 a first expanding hole section substantially aligned
3 with said first narrow hole section and expanding
4 towards an insertion direction of at least one of said
5 fiber ends.

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1 24. The apparatus of claim 22, wherein said bottom plate
2 has a second expanding hole section substantially
3 aligned with said second narrow hole section and
4 expanding towards an insertion direction of at least
5 one of said fiber ends.

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1 25. A method for positioning and attaching a frame to a housing,
2 said method comprising the following steps of:
3 a. providing solder pins on said housing such that said
4 solder pins reach within holes of said frame with a

gap that provides a predetermined adjustment range of
said frame relative to said housing;
b. positioning said frame relative to said housing while
said solder pins reach into said holes; and
c. soldering said gap.

26. The method of claim 25, wherein a lens plate is
attached to said frame.

27. The method of claim 25, wherein said housing is part
of an optical connector.